

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 March 2001 (22.03.2001)

PCT

(10) International Publication Number  
**WO 01/19311 A1**

(51) International Patent Classification<sup>7</sup>: **A61F 13/532** (72) Inventor: DIPALMA, Joseph; 451 East Peckham Street, Neenah, WI 54956 (US).

(21) International Application Number: PCT/US00/40758

(74) Agents: KOTTIS, Nick, C.; Pauley Petersen Kinne & Fejfer, Suite 365, 2800 West Higgins Road, Hoffman Estates, IL 60195 et al. (US).

(22) International Filing Date: 28 August 2000 (28.08.2000)

(25) Filing Language: English

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(26) Publication Language: English

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

(30) Priority Data:

09/396,646 15 September 1999 (15.09.1999) US  
09/397,248 15 September 1999 (15.09.1999) US

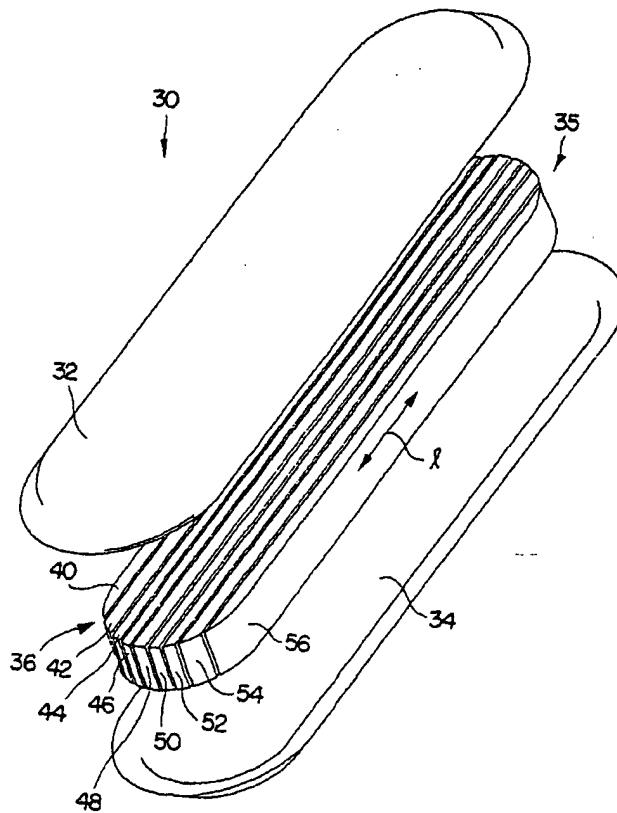
(71) Applicant: KIMBERLY-CLARK WORLDWIDE,  
INC. [US/US]; 401 North Lake Street, Neenah, WI 54956  
(US).

[Continued on next page]

(54) Title: ABSORBENT ARTICLE HAVING VERTICALLY ORIENTATED FLOW REGULATING WALLS AND METHOD FOR FORMING



**WO 01/19311 A1**



(57) Abstract: Absorbent pad assemblies and articles are provided which include at least a first generally planar fluid conveyance barrier member of preselected permeability interposed between first and second vertically orientated absorbent members. Also provided is a method for forming an absorbent structure wherein a fluid conveyance barrier member of preselected permeability is adjacently disposed between first and second absorbent members with the barrier member and the first and second absorbent members orientated such that as to have a specifically desired ratio of horizontal width to vertical height.



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *With international search report.*
- *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

## ABSORBENT ARTICLE HAVING VERTICALLY ORIENTATED FLOW REGULATING WALLS AND METHOD FOR FORMING

### FIELD OF THE INVENTION

5 This invention relates generally to absorbent articles for absorbing body fluids and exudates. More particularly, the present invention relates to absorbent pad assemblies and associated absorbent articles having improved fluid flow control or management, as well as a method of making or forming the same.

### BACKGROUND OF THE INVENTION

10 A wide variety of types of structures are known in the art for use in or as absorbent articles, particularly disposable absorbent articles, used to collect various body fluids and exudates. Commercial absorbent articles include diapers, adult incontinence products, sanitary napkins and bandages. Disposable products of this type generally comprise components for receiving, absorbing and retaining fluids. Typically, the  
15 components of such articles include a liquid permeable topsheet, an absorbent core and a liquid impermeable backsheet.

The components of typical absorbent articles are commonly plied or arranged in a horizontal fashion with a major planar surface facing the fluid intake area, e.g., the body of the wearer. In such absorbent articles, the nature or make-up of the fluid communicating therethrough can and typically will change as such fluid traverses though the horizontal ply or plies. Thus, such absorbent articles may experience undesirable horizontal dependency between components. Further, the fibers which customarily make-up the absorbent core are often orientated randomly with fibers within a mat in a lateral neighboring arrangement such that the fluid intake typically wicks in a radial fashion or pattern.  
20

25 One of the main objectives in the development of absorbent articles is to increase, improve or maximize utilization of the absorbent capacity of the article. In general, products of the type described above typically distribute liquids deposited on the topsheet in a circular pattern. Since such structures generally have a length that exceeds their width, this may undesirably result in the fluids, e.g., exudates, reaching the longitudinal side edges of the absorbent article prior to the desirable utilization of the absorbent capacity at the end regions of the absorbent article. As will be appreciated, such occurrence may undesirably increase the possibility or likelihood of leakage from the sides of the article despite the  
30

availability of unutilized or underutilized absorbent capacity in the end regions of the absorbent article.

Moreover, such absorbent articles can and may be subjected to a wide range of conditions and applications such as due to factors inherent or related to the environment in which the article is utilized. Thus, the fluids which may need to be absorbed thereby may vary in properties or parameters such as including flow rate as well as form, phase or composition. For example, exudates may be multiphasic and heterogeneous, such as in the case of menses which may include red blood cells, mucin, plasma and tissue debris, for example.

10 Sanitary napkins (also referred to as catamenial pads), feminine pads, overnight pads, panty liners and panty shields are designed to be worn by a female to absorb menses and other body fluids discharged before, during and after a menstrual period. Sanitary napkins are external devices which are designed to be aligned approximate the pudendum region of a human body and are generally held in position by being adhesively or mechanically attached to an undergarment. Sanitary napkins also typically differ from panty liners and panty shields in several notable ways. Sanitary napkins are generally larger in size and have a more defined 3-dimensional configuration, are thicker in caliper and have a greater fluid capacity than panty liners or panty shields.

20 In view of the desire to provide increased comfort to the wearer and to minimize the appearance of the presence of such absorbent articles there is an ongoing demand and need for smaller or less bulky absorbent articles. Thus, there is a need and a demand for improved absorbent pad assemblies and absorbent articles such as may result in more complete utilization of the absorbent capacity thereof and such as may more effectively and efficiently respond to the possibly wide range of operating and performance conditions to which such assemblies and articles can be exposed. More particularly, there is a need and a demand for absorbent pad assemblies and absorbent articles which have improved control or management of fluid flow in association therewith.

### SUMMARY OF THE INVENTION

A general object of the invention is to provide an improved absorbent pad assembly and absorbent article. Another general object of the invention is to provide a method for forming absorbent structures such as either or both an improved absorbent pad assembly and absorbent article.

5 A more specific objective of the invention is to overcome one or more of the problems described above.

A general object of the invention can be attained, at least in part, through a specific absorbent pad assembly. In accordance with one preferred embodiment, the absorbent pad assembly includes at least a first generally planar fluid conveyance barrier member of preselected permeability interposed between first and second vertically orientated absorbent members.

10 The prior art generally fails to provide absorbent pad assemblies and absorbent articles which make as complete or full utilization of the absorbent capacity thereof as may be desired. The prior art also generally fails to provide absorbent pad assemblies and absorbent articles which can respond to the possibly wide range of operating and performance conditions to which such assemblies and articles can be exposed and to do so in an as effective and efficient a manner as may be desired.

15 The invention further comprehends a specific absorbent article. In accordance with one preferred embodiment of the invention, such an absorbent article has a contact surface and includes an absorbent pad assembly. The absorbent pad assembly includes at least first and second generally planar fluid conveyance barrier members. Each of the barrier members has a preselected permeability and is interposed between a pair of absorbent members which are generally perpendicularly disposed relative to the contact surface.

20 Another aspect of the invention relates to specific methods for forming such and similar absorbent structures. In accordance with one embodiment, one such method involves adjacently disposing at least a first generally planar fluid conveyance barrier member of preselected permeability between at least first and second absorbent members and orientating the adjacently disposed barrier member and first and second absorbent members wherein each of the first and second absorbent members has a ratio of horizontal width to vertical height of no more than about 10:1.

In accordance with another embodiment, a method for forming an absorbent pad assembly is provided. Such a method involves horizontally layering at least a first generally planar fluid conveyance barrier member of preselected permeability between first and second absorbent members and vertically reorientating the horizontally layered barrier member and first and second absorbent members.

In accordance with another embodiment, a method for improving the fluid management by an absorbent article which includes a liquid pervious cover, a liquid impervious backsheet and an absorbent pad assembly disposed between the cover and the backsheet is provided. The method involves the utilization of an absorbent pad assembly which includes a first generally planar fluid conveyance barrier member having a preselected permeability interposed between a pair of absorbent members generally perpendicularly disposed relative to the contact surface. As described in greater detail below, one particular form of such an absorbent article is a sanitary napkin.

As used herein, references to "absorbent article(s)" are to be understood to refer to products such as diapers, sanitary napkins, training pants, incontinent garments, overnight pads, panty liners, under arm shields and the like, which are used to absorb body fluids and exudates, such as urine, menses, blood, perspiration and other excrements discharged by the body.

Further, references herein to absorbent members as being "vertically orientated" are to be understood to refer to the general disposition of the member and are in general reference relative to the body contacting surface or face of the absorbent article itself. In general, vertically orientated absorbent members are to be understood as having a ratio of horizontal width to vertical height of no more than about 10:1, preferably no more than about 5:1 and, more preferably about 1:1 or less.

References herein to adjacent absorbent members as being "noncontinuous" are to be understood to refer to such adjacent absorbent members as forming or having a surface interface therebetween. As will be appreciated, such a surface interface may, in practice, serve to hinder, prevent or avoid fluid passage between or from one to another of the adjacent absorbent members. As will be appreciated and as described in greater detail below, adjacent absorbent members will preferably differ in one or more property or characteristic such as chemical composition or construction such as fiber orientation or

thickness, for example. Other effective properties or characteristics by which adjacent absorbent members may differ will be apparent to those skilled in the art and guided by the teachings herein provided.

5 References herein to adjacent absorbent members as forming a "surface interface" therebetween are to be understood as referring to the formation between adjacent members of a surface at which the adjacent members contact or are in proximity to each other.

10 References herein to "contact surface" are to be understood as referring to that surface of the absorbent member, pad assembly, article or the like with which the fluid to be absorbed initially contacts.

15 Other objects and advantages will be apparent to those skilled in the art from the following detailed description taken in conjunction with the appended claims and drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view schematic of an absorbent article having a pad assembly in accordance with one preferred embodiment of the invention.

FIG. 2 is a partial sectional perspective view schematic of the absorbent article shown in FIG. 1.

20 FIG. 3 is a simplified sectional side view schematic of the absorbent article shown in FIGS. 1 and 2.

FIGS. 4-6 are simplified fragmentary top view schematics of absorbent articles in accordance with alternative embodiments of the invention.

FIGS. 7-9 are simplified sectional side view schematics of absorbent articles, as viewed along the X-X axis, in accordance with alternative embodiments of the invention.

25

30

**DETAILED DESCRIPTION OF THE  
PRESENTLY PREFERRED EMBODIMENTS**

The present invention, as is described in more detail below, provides an improved absorbent pad assembly and absorbent article as well as a method for forming such absorbent products.

Referring initially to FIGS. 1-3, there is illustrated an absorbent article, generally designated by the reference numeral 30, in accordance with one embodiment of the invention and which article is capable of absorbing body fluid. The absorbent article can be a diaper, training pant, sanitary napkin, panty liner, overnight pad, incontinence garment, underarm shield or other type of absorbent product capable of absorbing one or more bodily fluid such as urine, menses, blood, perspiration, excrement or the like. As will be appreciated, such an absorbent article will typically be disposable in nature. While the absorbent article 30 will be described herein in terms of a feminine care product such as a sanitary napkin, it is to be understood that the broader practice of the invention is not necessarily so limited and that the invention can, if desired be practiced in or in association with other types or forms of absorbent articles such as identified above.

The absorbent article 30 comprises a generally liquid pervious topsheet or cover 32 on the body-side surface of the article, a generally liquid impervious backsheet or baffle 34 on the opposing garment-facing side of the article and an absorbent core 35, disposed and enclosed therebetween.

It will be appreciated that absorbent articles such as feminine care products such as sanitary napkins may typically include additional standard or usual features such as relating to the positioning or placement of the article when in use. For example, certain sanitary napkin designs incorporate side flaps, sometimes referred to as "wings," such as can be helpful in preventing fluid flow from the sides of the napkin. Another example of such a feature is the inclusion or presence of an adhesive at or about the garment facing region face of the backsheet. Such adhesive surface of the article can be covered by a release paper or the like, as is known in the art, prior to use such as when in a packaged state. As such features are standard or common, are well known to those skilled in that art and form no part of the broader invention, they will not be shown or described in great detail herein.

The topsheet or cover 32 is generally designed to contact the body of the user and generally forms the contact surface of the absorbent article 30. In practice, the topsheet 32 can be constructed of a woven or nonwoven material, from synthetic or natural materials and desirably should be easily penetrated by body fluid. Suitable materials include bonded carded webs of polyester, polypropylene, polyethylene, nylon or other heat-bondable fibers. Other polyolefins, such as copolymers of polypropylene and polyethylene, linear low-density polyethylene, finely perforated film webs and net material also work well. The topsheet 32 may also be constructed of a thermoplastic film which contains apertures and is flanked on one or both sides by a nonwoven material. Such an embodiment may desirably present a relatively soft feel against a user's thigh while allowing the rapid passage therethrough of body fluid.

The backsheet or baffle 34 is generally liquid impermeable and is designed to face the inner surface of an adjacent garment article, e.g., the crotch portion of an undergarment (not shown). The backsheet 34 may desirably be designed to permit the passage of air or vapor out of the absorbent article 30 while preventing or blocking the passage of fluids therethrough. As will be appreciated, the backsheet 34 can be made of any suitable material capable of providing or having the above-identified properties or characteristics. For example, suitable materials may include a microembossed polymeric film such as of polyethylene or polypropylene.

In general, the topsheet 32 and the backsheet 34 can be placed coextensive, in face-to-face contact around or about the absorbent core 35. Further, the topsheet 32 has a periphery 32a and the backsheet 34 has a periphery 34a which are desirably joined or sealed together by use of an adhesive, by heat sealing ultrasonics or other suitably selected techniques such as are known to those skilled in the art.

The absorbent core 35 is formed at least in part by an absorbent pad assembly 36. As shown in FIGS. 2 and 3, the absorbent pad assembly is a three-dimensional structure having a horizontal axis X-X, a vertical axis Z-Z and a length axis Y-Y. The absorbent pad assembly 36 includes a plurality of vertically orientated absorbent members 40, 42, 44, 46, 48, 50, 52, 54 and 56, respectively.

In practice, absorbent pad assemblies in accordance with the invention will typically include at least two and, preferably, at least three, such vertically orientated

absorbent members. As will be appreciated, the specific number or nature of the absorbent members included within an absorbent pad assembly in accordance with the invention can generally be selected by one skilled in the art and guided by the teachings herein provided in order to satisfy the required or desired performance criteria of the particular application to which the assembly under consideration is directed. For example, absorbent members of the same or different material, construction, or absorbency characteristics or properties may be utilized for two or more, up to all the absorbent members making up a particular absorbent pad assembly in accordance with the invention. In general, however, in order to more fully realize the possible advantages attendant a multiple member absorbent pad assembly, absorbent pad assemblies in accordance with the invention will include at least two absorbent members different material, construction, or absorbency characteristics or properties.

As shown, a first generally planar fluid conveyance barrier member or fluid flow regulating wall 41 is interposed between the absorbent members 40 and 42. Similarly, a generally planar fluid conveyance barrier member or flow regulating wall 43 is interposed between the absorbent members 42 and 44. Further, generally planar fluid conveyance barrier members 45, 47, 49, 51, 53, and 55 are interposed between otherwise adjacent absorbent member pairs 44 and 46, 46 and 48, 48 and 50, 50 and 52, 52 and 54, as well as 54 and 56, respectively. As will be appreciated, the barrier members are each generally perpendicularly disposed relative to the contact surface of the absorbent article 30.

The barrier members (also sometimes referred to hereinafter as "flow regulating walls" or "fluid flow regulating walls") can take various forms and have a particular preselected permeability. Further, such barrier members may be incorporated in absorbent pad assemblies and absorbent articles in particular or specific arrangements such as to provide or result in particular or specific fluid flow control or management.

For example, one or more barrier members incorporated into an absorbent pad assembly and absorbent article in accordance with the invention may be semipermeable or impermeable to the fluid material to be controlled or regulated thereby, as may be specifically desired for or in particular applications or uses. Alternatively or in addition, one or more barrier members incorporated into a particular absorbent pad assembly and absorbent article in accordance with the invention may be in the form of a fluid flow directional material.

5        Barrier members for use in the practice of the invention can be fabricated or formed of various suitable materials of preselected permeability, such as are known in the art. Suitable impermeable barrier members can, dependent on the particular application, include coatings or films such as prevent the transmission of fluid therethrough. For example, such an impermeable coating or film can be applied to a suitable substrate such as to form an impermeable barrier member. Further suitable impermeable barrier members can, dependent on the particular application, include impermeable backsheet materials, such as described above, or non-absorbent foams, such as a closed cell, crosslinked or a non-crosslinked polyolefin foam, including, for example, polypropylene or a polyethylene foam. Examples of commercially available foams contemplated for such use in the present invention include the trade name CA-30 foam manufactured by Sealed Air Corp. of Fair 10      15      20      25      30      35      40      45      50      55      60      65      70      75      80      85      90      95      100      105      110      115      120      125      130      135      140      145      150      155      160      165      170      175      180      185      190      195      200      205      210      215      220      225      230      235      240      245      250      255      260      265      270      275      280      285      290      295      300      305      310      315      320      325      330      335      340      345      350      355      360      365      370      375      380      385      390      395      400      405      410      415      420      425      430      435      440      445      450      455      460      465      470      475      480      485      490      495      500      505      510      515      520      525      530      535      540      545      550      555      560      565      570      575      580      585      590      595      600      605      610      615      620      625      630      635      640      645      650      655      660      665      670      675      680      685      690      695      700      705      710      715      720      725      730      735      740      745      750      755      760      765      770      775      780      785      790      795      800      805      810      815      820      825      830      835      840      845      850      855      860      865      870      875      880      885      890      895      900      905      910      915      920      925      930      935      940      945      950      955      960      965      970      975      980      985      990      995      1000      1005      1010      1015      1020      1025      1030      1035      1040      1045      1050      1055      1060      1065      1070      1075      1080      1085      1090      1095      1100      1105      1110      1115      1120      1125      1130      1135      1140      1145      1150      1155      1160      1165      1170      1175      1180      1185      1190      1195      1200      1205      1210      1215      1220      1225      1230      1235      1240      1245      1250      1255      1260      1265      1270      1275      1280      1285      1290      1295      1300      1305      1310      1315      1320      1325      1330      1335      1340      1345      1350      1355      1360      1365      1370      1375      1380      1385      1390      1395      1400      1405      1410      1415      1420      1425      1430      1435      1440      1445      1450      1455      1460      1465      1470      1475      1480      1485      1490      1495      1500      1505      1510      1515      1520      1525      1530      1535      1540      1545      1550      1555      1560      1565      1570      1575      1580      1585      1590      1595      1600      1605      1610      1615      1620      1625      1630      1635      1640      1645      1650      1655      1660      1665      1670      1675      1680      1685      1690      1695      1700      1705      1710      1715      1720      1725      1730      1735      1740      1745      1750      1755      1760      1765      1770      1775      1780      1785      1790      1795      1800      1805      1810      1815      1820      1825      1830      1835      1840      1845      1850      1855      1860      1865      1870      1875      1880      1885      1890      1895      1900      1905      1910      1915      1920      1925      1930      1935      1940      1945      1950      1955      1960      1965      1970      1975      1980      1985      1990      1995      2000      2005      2010      2015      2020      2025      2030      2035      2040      2045      2050      2055      2060      2065      2070      2075      2080      2085      2090      2095      2100      2105      2110      2115      2120      2125      2130      2135      2140      2145      2150      2155      2160      2165      2170      2175      2180      2185      2190      2195      2200      2205      2210      2215      2220      2225      2230      2235      2240      2245      2250      2255      2260      2265      2270      2275      2280      2285      2290      2295      2300      2305      2310      2315      2320      2325      2330      2335      2340      2345      2350      2355      2360      2365      2370      2375      2380      2385      2390      2395      2400      2405      2410      2415      2420      2425      2430      2435      2440      2445      2450      2455      2460      2465      2470      2475      2480      2485      2490      2495      2500      2505      2510      2515      2520      2525      2530      2535      2540      2545      2550      2555      2560      2565      2570      2575      2580      2585      2590      2595      2600      2605      2610      2615      2620      2625      2630      2635      2640      2645      2650      2655      2660      2665      2670      2675      2680      2685      2690      2695      2700      2705      2710      2715      2720      2725      2730      2735      2740      2745      2750      2755      2760      2765      2770      2775      2780      2785      2790      2795      2800      2805      2810      2815      2820      2825      2830      2835      2840      2845      2850      2855      2860      2865      2870      2875      2880      2885      2890      2895      2900      2905      2910      2915      2920      2925      2930      2935      2940      2945      2950      2955      2960      2965      2970      2975      2980      2985      2990      2995      3000      3005      3010      3015      3020      3025      3030      3035      3040      3045      3050      3055      3060      3065      3070      3075      3080      3085      3090      3095      3100      3105      3110      3115      3120      3125      3130      3135      3140      3145      3150      3155      3160      3165      3170      3175      3180      3185      3190      3195      3200      3205      3210      3215      3220      3225      3230      3235      3240      3245      3250      3255      3260      3265      3270      3275      3280      3285      3290      3295      3300      3305      3310      3315      3320      3325      3330      3335      3340      3345      3350      3355      3360      3365      3370      3375      3380      3385      3390      3395      3400      3405      3410      3415      3420      3425      3430      3435      3440      3445      3450      3455      3460      3465      3470      3475      3480      3485      3490      3495      3500      3505      3510      3515      3520      3525      3530      3535      3540      3545      3550      3555      3560      3565      3570      3575      3580      3585      3590      3595      3600      3605      3610      3615      3620      3625      3630      3635      3640      3645      3650      3655      3660      3665      3670      3675      3680      3685      3690      3695      3700      3705      3710      3715      3720      3725      3730      3735      3740      3745      3750      3755      3760      3765      3770      3775      3780      3785      3790      3795      3800      3805      3810      3815      3820      3825      3830      3835      3840      3845      3850      3855      3860      3865      3870      3875      3880      3885      3890      3895      3900      3905      3910      3915      3920      3925      3930      3935      3940      3945      3950      3955      3960      3965      3970      3975      3980      3985      3990      3995      4000      4005      4010      4015      4020      4025      4030      4035      4040      4045      4050      4055      4060      4065      4070      4075      4080      4085      4090      4095      4100      4105      4110      4115      4120      4125      4130      4135      4140      4145      4150      4155      4160      4165      4170      4175      4180      4185      4190      4195      4200      4205      4210      4215      4220      4225      4230      4235      4240      4245      4250      4255      4260      4265      4270      4275      4280      4285      4290      4295      4300      4305      4310      4315      4320      4325      4330      4335      4340      4345      4350      4355      4360      4365      4370      4375      4380      4385      4390      4395      4400      4405      4410      4415      4420      4425      4430      4435      4440      4445      4450      4455      4460      4465      4470      4475      4480      4485      4490      4495      4500      4505      4510      4515      4520      4525      4530      4535      4540      4545      4550      4555      4560      4565      4570      4575      4580      4585      4590      4595      4600      4605      4610      4615      4620      4625      4630      4635      4640      4645      4650      4655      4660      4665      4670      4675      4680      4685      4690      4695      4700      4705      4710      4715      4720      4725      4730      4735      4740      4745      4750      4755      4760      4765      4770      4775      4780      4785      4790      4795      4800      4805      4810      4815      4820      4825      4830      4835      4840      4845      4850      4855      4860      4865      4870      4875      4880      4885      4890      4895      4900      4905      4910      4915      4920      4925      4930      4935      4940      4945      4950      4955      4960      4965      4970      4975      4980      4985      4990      4995      5000      5005      5010      5015      5020      5025      5030      5035      5040      5045      5050      5055      5060      5065      5070      5075      5080      5085      5090      5095      5100      5105      5110      5115      5120      5125      5130      5135      5140      5145      5150      5155      5160      5165      5170      5175      5180      5185      5190      5195      5200      5205      5210      5215      5220      5225      5230      5235      5240      5245      5250      5255      5260      5265      5270      5275      5280      5285      5290      5295      5300      5305      5310      5315      5320      5325      5330      5335      5340      5345      5350      5355      5360      5365      5370      5375      5380      5385      5390      5395      5400      5405      5410      5415      5420      5425      5430      5435      5440      5445      5450      5455      5460      5465      5470      5475      5480      5485      5490      5495      5500      5505      5510      5515      5520      5525      5530      5535      5540      5545      5550      5555      5560      5565      5570      5575      5580      5585      5590      5595      5600      5605      5610      5615      5620      5625      5630      5635      5640      5645      5650      5655      5660      5665      5670      5675      5680      5685      5690      5695      5700      5705      5710      5715      5720      5725      5730      5735      5740      5745      5750      5755      5760      5765      5770      5775      5780      5785      5790      5795      5800      5805      5810      5815      5820      5825      5830      5835      5840      5845      5850      5855      5860      5865      5870      5875      5880      5885      5890      5895      5900      5905      5910      5915      5920      5925      5930      5935      5940      5945      5950      5955      5960      5965      5970      5975      5980      5985      5990      5995      6000      6005      6010      6015      6020      6025      6030      6035      6040      6045      6050      6055      6060      6065      6070      6075      6080      6085      6090      6095      6100      6105      6110      6115      6120      6125      6130      6135      6140      6145      6150      6155      6160      6165      6170      6175      6180      6185      6190      6195      6200      6205      6210      6215      6220      6225      6230      6235      6240      6245      6250      6255      6260      6265      6270      6275      6280      6285      6290      6295      6300      6305      6310      6315      6320      6325      6330      6335      6340      6345      6350      6355      6360      6365      6370      6375      6380      6385      6390      6395      6400      6405      6410      6415      6420      6425      6430      6435      6440      6445      6450      6455      6460      6465      6470      6475      6480      6485      6490      6495      6500      6505      6510      6515      6520      6525      6530      6535      6540      6545      6550      6555      6560      6565      6570      6575      6580      6585      6590      6595      6600      6605      6610      6615      6620      6625      6630      6635      6640      6645      6650      6655      6660      6665      6670      6675      6680      6685      6690      6695      6700      6705      6710      6715      6720      6725      6730      6735      6740      6745      6750      6755      6760      6765      6770      6775      6780      6785      6790      6795      6800      6805      6810      6815      6820      6825      6830      6835      6840      6845      6850      6855      6860      6865      6870      6875      6880      6885      6890      6895      6900      6905      6910      6915      6920      6925      6930      6935      6940      6945      6950      6955      6960      6965      6970      6975      6980      6985      6990      6995      7000      7005      7010      7015      7020      7025      7030      7035      7040      7045      7050      7055      7060      7065      7070      7075      7080      7085      7090      7095      7100      7105      7110      7115      7120      7125      7130      7135      7140      7145      7150      7155      7160      7165      7170      7175      7180      7185      7190      7195      7200      7205      7210      7215      7220      7225      7230      7235      7240      7245      7250      7255      7260      7265      7270      7275      7280      7285      7290      7295      7300      7305      7310      7315      7320      7325      7330      7335      7340      7345      7350      7355      7360      7365      7370      7375      7380      7385      7390      7395      7400      7405      7410      7415      7420      7425      7430      7435      7440      7445      7450      7455      7460      7465      7470      7475      7480      7485      7490      7495      7500      7505      7510      7515      7520      7525      7530      7535      7540      7545      7550      7555      7560      7565      7570      7575      7580      7585      7590      7595      7600      7605      7610      7615      7620      7625      7630      7635      7640      7645      7650      7655      7660      7665      7670      7675      7680      7685      7690      7695      7700      7705      7710      7715      7720      7725      7730      7735      7740      7745      7750      7755      7760      7765      7770      7775      7780      7785      7790      7795      7800      7805      7810      7815      7820      7825      7830      7835      7840      7845      7850      7855      7860      7865      7870      7875      7880      7885      7890      7895      7900      7905      7910      7915      7920      7925      7930      7935      7940      7945      7950      7955      7960      7965      7970      7975      7980      7985      7990      7995      8000      8005      8010      8015      8020      8025      8030      8035      8040      8045      8050      8055      8060      8065      8070      8075      8080

embodiments of the invention, one or more of the barrier members may be in the form of such a film, foam or the like and which, is dissolvable after fluid contact such as to provide or result in a time release effect.

Thus, in the absorbent article 30 shown in FIGS. 1-3, the barrier members 45, 47, 49 and 51 are substantially fluid impermeable, such as prevent or avoid fluid flow therethrough. The barrier members 43 and 53 are semipermeable. That is, the semipermeable barrier member 43 permits selected fluid flow in the direction from the absorbent member 42 to the absorbent member 44 and vice versa. Similarly, the semipermeable barrier member 53 permits selected fluid flow in the direction from the absorbent member 52 to the absorbent member 54 and vice versa. In addition, the barrier members 41 and 55 are flow directional. That is, the barrier member 41 permits fluid flow in the direction from the absorbent member 40 to the absorbent member 42 but not vice versa. Similarly, the barrier member 55 permits fluid flow from the absorbent member 56 to the absorbent member 54 but not vice versa. In FIG. 3, the flow directional nature of the barrier members 41 and 55 is schematically signified by the cones 57 shown thereon. As shown, each of the cones 57 include an apex 58 pointed in the direction in which the flow is directed thereby. The use of fluid flow directional barrier members adjacent or otherwise near one or more of the terminal absorbent members of a particular absorbent pad assembly can be helpful in better ensuring either or both avoidance of fluid overflow over the edge of the pad assembly and increased utilization of the existing absorbency within the pad assembly. However, it is to be understood that numerous various particular arrangements of barrier and absorbent members in accordance with the invention are possible and the broader practice of the invention is not generally limited to a specific or particular such arrangement. For example, one or more such fluid flow directional barrier members can, if desired, be positioned and orientated such as to direct flow toward an edge, rather than the center, of the respective absorbent pad assembly.

Further, one or more barrier members in accordance with the invention may be vertically coextensive with adjacent associated absorbent members, such as shown by the barrier members 41, 43, 47, 49, 53, and 55. Alternatively or in addition, one or more barrier members in accordance with the invention may be vertically non-coextensive with adjacent absorbent members, such as shown by the barrier member 45 relative to adjacent

absorbent members 44 and 46, respectively, and barrier member 51 relative to adjacent absorbent members 50 and 52, respectively. Thus, adjacent absorbent member 44 and 46 form a surface interface 60 therebetween and adjacent absorbent members 50 and 52 form a surface interface 62. In the preferred illustrated embodiment, the surface interfaces 60 and 62 are generally positioned at the side of the absorbent article 30 opposite the contact surface shown by the cover 32, e.g., adjacent or near the backsheet 34. It is to be understood, however, that the broader practice of the invention is not necessarily so limited.

The surface interfaces 60 and 62 permit fluid to be transferred or communicated from the one adjacent absorbent member to the other. As will be appreciated, such structure or arrangement can serve to facilitate the more complete utilization of the absorbent capacity of a particular absorbent pad assembly. For example, in accordance with certain preferred embodiments of the invention, fluid would generally communicate across such surface interface only after the absorbent capacity of one or the other of the adjacent absorbent members has been significantly utilized.

As shown, the otherwise adjacent absorbent members are horizontally displaced relative to each other along the entire vertical heights thereof. That is, such otherwise adjacent absorbent members generally do not have any portions having the same placement on the X-X axis. For example, no portion of absorbent member 40 underlies or has the same X-X axis placement as a portion of adjacent absorbent member 42.

Each of the absorbent members 40, 42, 44, 46, 48, 50 and 52 is generally planar and perpendicularly disposed relative to the contact surface of the absorbent article 30. The absorbent members each have a vertical height (h), a horizontal width (w) and a longitudinal length (l). As will be appreciated, the specific height, width and length of the absorbent members used will generally be selected to satisfy the particular requirement of the application to which such absorbent members are to be applied. Absorbent members used in the practice of the invention will generally have a width of in the range of about 0.03 mm to no more than about 20 mm and a height of about 1 mm to about 15 mm. In practice, however, absorbent members used in the invention will typically have a width of no more than about 8 mm (e.g., in the range of about 0.5 mm to about 8 mm) and, preferably, will have a width of no more than about 5 mm (e.g., in the range of about 1 mm to about 5 mm).

In addition, one or more of the vertical height, horizontal width and longitudinal length of a particular absorbent member may be the same or different from that of other absorbent member or members of a particular pad assembly. For example, as shown in FIG. 1, side disposed absorbent member 56 is of shorter length (l) than centrally placed absorbent members such as absorbent members 46, 48 and 50. Also, as shown in FIG. 3, absorbent member 42 is of greater width (w) than absorbent member 44, for example. Similarly, while FIG. 3 shows each of the absorbent members as having substantially the same vertical height (h) and while such use may facilitate manufacture and assembly and thus be generally preferred, absorbent members having different or otherwise selected vertical heights can be used.

In accordance with certain preferred embodiments of the invention, one or more of the vertical height, horizontal width and longitudinal length of a particular absorbent member may be varying or constant and uniform for the entire absorbent member, as may be desired in a particular application. Further, in those absorbent members wherein one or more of the vertical height, horizontal width and longitudinal length varies, such variation may be continuous or in one or more steps. Still further, such variation, if present, may be uniform or not, as may be desired.

In accordance with the invention, the absorbent members are advantageously arranged such as to generally provide a much lower width to height ratio than normally obtained or realized in absorbent articles such as sanitary napkins. Such an absorbent member arrangements, with a significantly lower width to height ratios, promote wicking in the directions of the Y-Y and Z-Z axis since fluid is more likely to travel to fibers in close proximity rather than span across vertically disposed surface interfaces formed between the adjacent absorbent members.

Further, the vertical orientation of adjacent absorbent members in accordance with the invention permits the design of absorbent pad assemblies and associated absorbent articles which facilitate the use of selected and multiple absorbent materials in close proximity to the fluid intake area. As will be appreciated by those skilled in the art, at least certain absorbent articles, including various feminine care products such as including sanitary napkins, may be required to satisfactorily perform in association with fluids having variable or a wide range of possible or likely constituents. Thus, the subject invention development

5

of absorbent pad assemblies and absorbent articles wherein possible multiple different absorbent materials can be conveniently placed in close proximity to the fluid intake area is a significant advancement in the art. Also, the absorbent pad assemblies and absorbent articles of the invention can advantageously avoid complications such as relating to horizontal dependency, such as described above.

In accordance with one preferred embodiment of the invention, absorbent members preferably have a width to height ratio of less than 1 in order to more fully realize the benefits of the specifically orientated absorbent members of the subject absorbent pad assembly and absorbent article.

10

While the height and width of each of the absorbent members for the absorbent pad assembly 36 are the same, it is to be understood that the broader practice of the invention is not necessarily so limited and that the invention can, if desired, be practiced in conjunction with absorbent members which differ in height, width or both.

15

Absorbent members for use in the practice of the invention can be fabricated or formed of various suitable absorbent materials such as are known in the art. For example, selected absorbent members for use in the practice of the invention can be fabricated or formed of various hydrophilic types of natural or synthetic fibers including cellulose fibers, surfactant-treated meltblown fibers, wood pulp fibers, regenerated cellulose, cotton fibers or a blend of other fibers.

20

25

30

Absorbent member materials of construction can include a material described in U.S. Patent 4,100,324 and generally known as coform. Coform is available from the Kimberly-Clark Corporation located in Neenah, Wisconsin and is generally a nonwoven material made up of an airform matrix of thermoplastic polymeric fibers and a multiplicity of individualized wood pulp fibers, and has a fabric-like finish. The thermoplastic fiber polymers generally have an average diameter of less than 10 microns with the individualized wood pulp fibers dispersed throughout the matrix and serving to space these microfibers from each other. Such material can be formed by initially utilizing the primary air stream with the meltblown microfibers and the secondary air stream containing wood pulp fibers and merging the two streams under turbulent conditions to form an integrated air stream along a forming surface.

In certain embodiments, the use of absorbent materials in the nature of surge materials may be desired. Various woven fabrics and nonwoven webs can be used to construct surge materials. For example, a surge material may be a nonwoven fabric layer composed of a meltblown or spumbond web of polyolefin filaments. Such nonwoven fabric layers may include conjugate, biconstituent and homopolymer fibers of staple or other lengths and mixtures of such fibers with other types of fibers. The surge material also can be a bonded carded web or an airlaid web composed of natural and/or synthetic fibers. The bonded carded web may, for example, be a powder bonded carded web, an infrared bonded carded web, or a through-air bonded carded web. The bonded carded webs can optionally include a mixture or blend of different fibers, and the fiber lengths within a selected web may range from about 3 mm to about 60 mm.

Examples of particular surge materials may be found in U.S. Patent 5,490,846 to Ellis et al. and in U.S. Patent 5,364,382 to Latimer. Surge materials may be composed of a substantially hydrophobic material, and the hydrophobic material may optionally be treated with a surfactant or otherwise processed to impart a desired level of wettability and hydrophilicity.

Another possible suitable absorbent material is the material known as PRISM available from Kimberly-Clark Corporation. A description of PRISM is taught in U.S. Patent 5,336,552 to Strack et al. and the disclosure of that patent is incorporated by reference herein in its entirety. PRISM is generally the nonwoven fabric and comprises extruded multicomponent polymeric strands including first and second polymeric components arranged in substantially distinctive zones across the cross-section of the multicomponent strands and extending continuously along the length of the multicomponent strands. Preferably, the strands are continuous filaments which may be formed by spunbonding techniques. The second component of the strands constitutes at least a portion of the peripheral surface of the multicomponent strands continuously along the length of the multicomponent strands and includes a blend of a polyolefin and an ethylene alkyl acrylate copolymer. Bonds between the multicomponent strands may be formed by the application of heat. More specifically, the first polymeric component of the multicomponent strands is present in an amount of from about 20 to about 80 percent by weight of the strands and the second polymeric component is present in an amount from about 80 to about 20 percent by

weight of the strands. Preferably, the first polymeric component of the multicomponent strands is present in an amount of from about 40 to about 60 percent by weight of the strands and the second polymeric component is present in an amount from about 60 to about 40 percent by weight of the strands.

5       The term "strand" as used herein refers to an elongated extrudate formed by passing a polymer through a forming orifice such a die. Strands include fibers, which are discontinuous strands having a definite length, and filaments, which are continuous strands of material. The nonwoven fabric of the present invention may be formed from staple multicomponent fibers. Such staple fibers may be carded and bonded to form the nonwoven  
10      fabric. Preferably, however, the nonwoven fabric of the present invention is made with continuous spunbond multicomponent filaments which are extruded, drawn and laid on a traveling forming surface.

15      The types of nonwoven materials that may be employed include powder-bonded-carded webs, infrared bonded carded webs, and through-air-bonded-carded webs. The infrared and through-air bonded carded webs can optionally include a mixture of different fibers, and the fiber lengths within a selected fabric web may be within the range of about 1.0 to 3.0 inch and an average bulk density of about 0.02 g/cc to about 0.12 g/cc.

20      Other suitable absorbent materials for use in the practice of the invention can include materials commonly referred to as superabsorbents. Superabsorbents can be in various forms including particulate and fibrous forms. Known superabsorbent materials include AFA-1 30-53C by Dow Chemical, and W77553 and FAV880A which are commercially available from the Stockhausen Company of Greensboro, North Carolina. Stockhausen's W77553 is a bulk polymerized polyacrylate with a hydrophobic surface treatment. Stockhausen's FAV880A is a highly crosslinked surface superabsorbent. AFA  
25      130-53C is a 850 to 1400 micron suspension polymerized polyacrylate material available from The Dow Chemical Company of Midland, Michigan.

30      Hydrocolloidal materials, commonly referred to as superabsorbents, can be in the form of a hydrogel-forming polymer composition which is water-insoluble, slightly cross-linked, and partially neutralized. It can be prepared from an unsaturated polymerizable, acid group-containing monomers and cross-linked agents. Such superabsorbents are taught in U.S. Patent 4,798,603 to Meyers et al., U.S. Reissue Patent 32,649 to Brandt et al. and

U.S. Patent 4,467,012 to Pedersen et al., as well as in published European Patent Application 0,339,461 to Kellenberger. The disclosures of these patents and the European Patent Application are incorporated by reference herein in their entirety.

5        Additionally, materials known as "slow rate" superabsorbents can also be used in the practice of the subject invention. By "slow rate" superabsorbent what is meant is a superabsorbent having an absorption time index (ATI) of at least 5 minutes and preferably more than 10 minutes. Adjusting the rate of absorbency of a superabsorbent may be achieved by modifications to the particle size, surface properties, and chemistry of the polymer. Such slow rate superabsorbents are described in greater detail in U.S. Patent 10      5,843,063 to Anderson et al., the disclosure of which patent is incorporated herein its entirety.

15      Suitable absorbent materials for use in the practice of the invention may also take the form of absorbent foams such as open cell polyurethane foam, such as disclosed in U.S. Patent 5,853,402 to Faulks et al., the disclosure of which patent is incorporated herein its entirety. Further, starch foams such as disclosed in U.S. Patent 5,506,277 to Griesbach III, the disclosure of which patent is incorporated herein its entirety, may also be used.

20      The invention may also utilize, as suitable absorbent materials, corrugated nonwoven fabrics such as the high bulk corrugated nonwoven fabric disclosed in U.S. Patent 3,668,054 to Stumpf, the disclosure of which patent is incorporated herein its entirety. As disclosed therein, such fabric generally comprises a corrugated web of initially aligned textile fibers implanted in a continuous thin film of a thermoplastic adhesive having an essentially constant thickness. The resulting web-adhesive material is then corrugated to provide the multitude of furrows and grooves, which are irregularly connected near their roots and along their respective sides.

25      As will be appreciated, appropriate materials for use in the practice of the invention can be variously suitably formed including being meltblown or airlaid or airformed. The term "meltblown fibers" generally refers to fibers formed by extruding a molten thermoplastic material through a plurality of fine, usually circular, die capillaries as molten threads or filaments and into converging high velocity gas (e.g., air) streams which attenuate the filaments of molten thermoplastic material to reduce their diameters. Thereafter, the meltblown fibers are typically carried by the high velocity gas stream and

deposited on a collecting surface to form a web of randomly disbursed meltblown fibers. Meltblown fibers may be continuous or discontinuous and are generally tacky when deposited onto a collecting surface. Meltblown materials are described in greater detail in U.S. Patent 5,656,361 to Vogt et al., the disclosure of which is fully incorporated herein by reference.

5

Further, absorbent member materials of construction which contain or include one or more of various additives such as coagulants, lysing agent or superabsorbents, for example, can also be used. As identified above, adjacent absorbent members will preferably differ in one or more property or characteristic such as chemical composition or construction such as fiber orientation or thickness, for example. In accordance with one preferred embodiment of the invention, such adjacent absorbent members advantageously preferably differ in a selected property or characteristic other than density and such as not easily obtainable with prior art techniques. In particular, the minimization or elimination of horizontal dependency by or between adjacent absorbent layers can result in the utilization of absorbent materials selected for special or particular properties or characteristic.

10

Moreover, it is to be understood that the broader practice of the invention is not necessarily limited to specific or particular absorbent materials and that other absorbent materials such as are known to those skilled in the art can, if desired, be used. For example, a wide assortment of materials have been designed and developed to better handle or address the various conditions to which such products may be required to perform.

15

In the practice of the invention, barrier members and absorbent members can be loosely plied or bonded to adjacent barrier members and absorbent members, as may be desired, such as via the use of adhesives, thermal or ultrasonic techniques, threading or sewing techniques or other suitable joining technique such as known in the art.

20

It is understood that the broader practice of the invention is not necessarily limited to the incorporation of absorbent pad assemblies, such as described above, as the whole or substantially entire absorbent core. For example, absorbent articles in accordance with the invention can incorporate such absorbent pad assemblies as a portion of the absorbent core with other absorbent elements, including possibly other absorbent materials, plied, folded or otherwise formed adjacent thereto. Further, absorbent articles in accordance with the invention can include a central portion which is formed by or includes other

30

absorbent elements with an absorbent pad assembly in accordance with the invention plied, folded or otherwise formed adjacent thereto.

FIGS. 4-6 are simplified fragmentary top view schematics of absorbent articles 70, 72, and 74, respectively, in accordance with alternative embodiments of the invention.

As shown in FIG. 4, the absorbent article 70 includes a backsheet 80, an absorbent core 82 and a topsheet (not shown). The absorbent core 82 includes a centrally positioned or placed absorbent pad assembly 84, similar to that described above with a plurality of vertically orientated absorbent members 86(a-i), respectively, with generally planar fluid conveyance barrier members 88(a-h) interposed between respective otherwise adjacent absorbent member pairs.

FIG. 5 illustrates the absorbent article 72 which includes a backsheet 90, an absorbent core 92, and a topsheet (not shown). The absorbent core 92 includes a centrally positioned or placed absorbent pad assembly 94, similar to that described above, however, with 2 or more absorbent members interposed between at least certain of the most adjacent of the barrier members.

More specifically, the absorbent pad assembly 94 includes a plurality of vertically orientated absorbent members 96(a-i), respectively, with generally planar fluid conveyance barrier members 98(a-d).

FIG. 6 illustrates the absorbent article 74 which includes a backsheet 100, an absorbent core 102, and a topsheet (not shown). The absorbent core 102 includes a centrally positioned or placed absorbent pad assembly 104, similar to those described above with a plurality of vertically orientated absorbent members 106(a-e), respectively, and generally planar fluid conveyance barrier members 108(a-d). In the absorbent pad assembly 104, however, one or more of the generally planar fluid conveyance barrier members 108(a-d) is in or of intermittent form. For example, the conveyance barrier member 108a include a first segment 110 and a second segment 112. Similarly the conveyance barrier member 108b includes segments 116, 120, and 122; the conveyance barrier member 108c includes segments 124, 126, and 130; and the conveyance barrier member 108d includes segments 132 and 134.

5 While the barrier member segments and absorbent members of the absorbent article 74 are shown as having a uniform or symmetrical pattern, the broader practice of the invention is not necessarily so limited. For example, either or both barrier member segments and absorbent members can be in non-uniform or non-symmetric pattern, in accordance with the needs of the specific application to which the absorbent pad assembly or absorbent article is to be applied.

10 While the segments for a particular barrier member need not necessarily be joined together, the use of joined together barrier member segments will generally simplify manufacture and assembly and is thus generally preferred. However, the use of segments which are not joined together may permit greater design flexibility as, for example, two or more different materials can be used for each of the segments of a particular barrier member.

15 FIGS. 7-9 are simplified sectional side view schematics of absorbent articles 140, 142, and 144, respectively, in accordance with certain alternative preferred embodiments of the invention, and viewed in the direction of the X-X axis.

20 FIG. 7 illustrates the absorbent article 140 which includes a topsheet 150 and a backsheet 152, such as described above, and an absorbent core 154. The absorbent core 154 includes an absorbent pad assembly 156, in accordance with one embodiment of the invention. More specifically, the absorbent pad assembly 156 is generally composed of a plurality of vertically orientated absorbent members 160(a-m), respectively, and generally planar fluid conveyance barrier members 162(a-f).

25 FIG. 8 illustrates the absorbent article 142 which includes a topsheet 166 and a backsheet 170, such as described above, and an absorbent core 172. The absorbent core 172 includes an absorbent pad assembly 174 in accordance with one particular embodiment of the invention and such as composed of a plurality of vertically orientated absorbent members 176(a-n), respectively, and generally planar fluid conveyance barrier members 180(a-i), in an arrangement in accordance with one preferred embodiment of the invention. In these and subsequent drawings, the semipermeable or directional nature of certain of such barrier members, is simply shown through the reference characters assigned thereto and identified herein rather than through the use of cones and the like such as used in relation to  
30 FIG. 3 and discussed above.

In accordance with such embodiment, the barrier members 180c and 180g are generally impermeable to fluid flow therethrough, the barrier members 180d, 180e and 180f are semipermeable in nature and as such do not generally permit the flow therethrough of at least certain materials, and the barrier members 180a, 180b, 180h and 180i are directional barriers such that fluid will generally preferably flow therethrough in a particular direction. More specifically, the barrier member 180a generally only permits fluid flow therethrough from the direction of the absorbent member 176a to the absorbent member 176b. Similarly, the barrier members 180b, 180h and 180i generally only permit fluid flow therethrough in the direction of the absorbent member 176b to the absorbent member 176c, in the direction of the absorbent member 176m to the absorbent member 176l, and the absorbent member 176n to the absorbent member 176m, respectively.

As will be apparent to those skilled in the art, such or similar designs or arrangements can be used such as to desirably provide an absorbent pad assembly or associated absorbent article having particularly desired or sought absorbency properties or characteristics, such as may be more particularly suited for specific applications or uses.

FIG. 9 illustrates the absorbent article 144 which includes a topsheet 180 and a backsheet 182, such as described above, and an absorbent core 184. The absorbent core 184 includes an absorbent pad assembly 186 in accordance with one particular embodiment of the invention and such as composed of a plurality of vertically orientated absorbent members 190(a-n), respectively, and generally planar fluid conveyance barrier members 192(a-i), in an arrangement in accordance with another preferred embodiment of the invention.

In the absorbent article 144, the barrier members 192b, 192c, 192g and 192h are each vertically non-coextensive with adjacent absorbent members such as desired above relative to the absorbent article 30 and as shown in FIG. 3 and such as may permit contact between selected portions of adjacent absorbent members.

It is to be understood that various modifications and combinations of the above-described embodiments are possible and are herein encompassed. For example, such possible modifications of the various above-described embodiments can involve the inclusion of one or more overlying or underlying void layer or layer of other selected absorbent article material. More particularly, it may be desirable to include within an

absorbent article, in accordance with the invention, a layer of a fluid retention material underlying an absorbent pad assembly, such as described above. In some applications it may be desirable to include a layer of fluid surge material, such as is known in the art, in overlying relation to an absorbent pad assembly, such as described above. Further, the extent of such overlying or underlying, as the case may be, of each such overlying or underlying layer can be partial or complete, as may be desired for a particular application.

Absorbent structures, in accordance with the invention, can be conveniently formed or made by adjacently disposing a first generally planar fluid conveyance barrier member of preselected permeability, such as described above, between selected absorbent members, such as also described above, and orientating the adjacently disposed barrier member and absorbent members to provide or otherwise result in a structure having a desired ratio of horizontal width to vertical height. As detailed above, structures in accordance with the invention advantageously include absorbent members having a ratio of horizontal width to vertical height of no more than about 10:1, preferably no more than about 5:1 and, more preferably about 1:1 or less. It is to be understood that the forming or making of such structures may involve the desired selection of one or more desired variables or parameters, such as described above, including: the number, size and shape of either or both adjacently disposed barrier and absorbent members as well as the properties, characteristics and materials of construction of either or both such barrier and absorbent members, for example, and such as guided by the teachings herein provided.

As will be appreciated, either or both the barrier and absorbent members may be initially provided in various orientations such as may or may not require subsequent reorientation. In one particular formation method in accordance with the invention, however, barrier and absorbent members are horizontally layered and subsequently vertically reorientated to provide the desired structure.

As described above, adjacent barrier and absorbent members can, if desired, be loosely plied or, if desired, bonded to one another such as via the use of adhesives, thermal or ultrasonic techniques, threading or sewing techniques or other suitable joining technique such as known in the art. In accordance with one preferred practice of the invention, such bonding, if used, is preferably done prior to any reorientation, that may be required.

Further, methods for forming such absorbent structures in accordance with the invention may include one or more cutting steps or operations. For example, adjacently disposed barrier and absorbent members may be appropriately cut to provide or supply an absorbent pad assembly in a desired selected shape or form such as suitable for the specific use to which such absorbent pad assembly is intended to be applied. Such cutting may occur prior, after or both prior and after orientation as may be desired in specific applications. Various means, such as known in the art, are available whereby such cutting of the adjacently disposed barrier and absorbent members can be accomplished including, slit blade and water jet cutting, for example.

While the invention has been described above relative to absorbent articles wherein the absorbent core contains a single absorbent pad assembly in accordance with the invention, it is to be understood that the broader practice of the invention is not necessarily so limited. For example, as will be appreciated by those skilled in the art, the invention can, if desired, be practiced with absorbent articles containing two or other selected multiple of such absorbent pad assemblies. Further, such absorbent articles may contain such two or more absorbent pad assemblies in spaced apart, overlying, partially overlapping or other selected relationship, as may be desired for a particular application.

Thus, the invention provides absorbent pad assemblies, absorbent articles and associated methods which permit the more complete or full utilization of the absorbent capacity thereof as may be desired. For example, absorbent pad assemblies and absorbent articles, can have barrier members, such as described above, situated between selected vertical segments of particular absorbent members to regulate fluid flow therein. In particular, such absorbent pad assemblies and absorbent articles can be orientated and designed such that the barrier members serve to direct fluid flow such as to permit better utilization of the absorbent capacity such as through better or more complete unitization of the center portion and length of the respective absorbent article while generally avoiding undesired saturation of the edges of the absorbent article with fluid such as by preferentially draining or directing fluid flow toward the center of the absorbent structure. In view of the above, it will be appreciated that the invention also generally provides absorbent pad assemblies, absorbent articles and associated methods which can respond to the possibly wide range of operating and performance conditions to which such assemblies and articles

can be exposed in either or both a more effective and efficient manner than previously otherwise attainable.

The invention illustratively disclosed herein suitably may be practiced in the absence of any element, part, step, component, or ingredient which is not specifically disclosed herein.

5 While in the foregoing detailed description this invention has been described in relation to certain preferred embodiments thereof, and many details have been set forth for purposes of illustration, it will be apparent to those skilled in the art that the invention is susceptible to additional embodiments and that certain of the details described herein can be  
10 varied considerably without departing from the basic principles of the invention.

**I CLAIM:**

1. An absorbent pad assembly comprising:  
at least a first generally planar fluid conveyance barrier member of preselected  
permeability interposed between first and second vertically orientated absorbent members.
2. The absorbent pad assembly of claim 1 wherein the at least first barrier  
member comprises an impermeable material.
3. The absorbent pad assembly of claim 1 wherein the at least first barrier  
member comprises a flow directional material.
4. The absorbent pad assembly of claim 1 wherein the at least first barrier  
member comprises a semipermeable material.
5. The absorbent pad assembly of claim 1 wherein the at least first barrier  
member and at least one of the first and second absorbent members are vertically  
coextensive.
6. The absorbent pad assembly of claim 5 wherein the at least first barrier  
member and both the first and second absorbent members are vertically coextensive.
7. The absorbent pad assembly of claim 1 wherein the at least first barrier  
member and at least one of the first and second absorbent members are vertically non-  
coextensive.
8. The absorbent pad assembly of claim 7 wherein the at least first barrier  
member and both the first and second absorbent members are vertically non-coextensive.
9. The absorbent pad assembly of claim 1 wherein the at least first barrier  
member is of intermittent form.

10. The absorbent pad assembly of claim 1 wherein the first and second absorbent members are each formed of materials of different absorbency.

11. The absorbent pad assembly of claim 1 wherein the first and second absorbent members are each formed of materials having similar absorbency.

12. The absorbent pad assembly of claim 1 additionally comprising a second barrier member spaced apart from the at least first barrier member by at least the second absorbent member.

13. The absorbent pad assembly of claim 12 wherein the second and at least first barrier members are spaced apart by at least one absorbent member in addition to the second absorbent member.

14. The absorbent pad assembly of claim 1 wherein at least one of the first and second absorbent members comprises a surge material.

15. The absorbent pad assembly of claim 1 wherein at least one of the first and second absorbent members comprises a superabsorbent.

16. The absorbent pad assembly of claim 1 wherein at least one of the first and second absorbent members comprises a nonwoven material made up of an airform matrix of thermoplastic polymeric fibers and a multiplicity of individualized wood pulp fibers.

17. The absorbent pad assembly of claim 1 wherein at least one of the first and second absorbent members comprises extruded multicomponent polymeric strands including first and second polymeric components arranged in substantially distinctive zones across the cross-section of the multicomponent strands and extending continuously along the length of the multicomponent strands.

18. An absorbent article having a contact surface, the absorbent article comprising:

an absorbent pad assembly which includes at least first and second generally planar fluid conveyance barrier members, each barrier member having a preselected permeability and interposed between a pair of absorbent members generally perpendicularly disposed relative to the contact surface.

19. The absorbent article of claim 18 wherein the first and second barrier members are of similar preselected permeability.

20. The absorbent article of claim 18 wherein the first and second barrier members are of dissimilar preselected permeability.

21. The absorbent article of claim 18 wherein at least one of the first and second barrier members comprises an impermeable material.

22. The absorbent article of claim 18 wherein at least one of the first and second barrier members comprises a flow directional material.

23. The absorbent article of claim 18 wherein at least one of the first and second barrier members comprises a semipermeable material.

24. The absorbent article of claim 18 wherein the first and second barrier members are spaced apart by a plurality of absorbent members.

25. The absorbent article of claim 18 additionally comprising a liquid impervious backsheet on a garment-facing side of the article.

26. The absorbent article of claim 18 additionally comprising a liquid pervious cover on a body-side surface of the article.

27. The absorbent article of claim 18 in the form of a sanitary napkin.

28. A method comprising:

adjacently disposing at least a first generally planar fluid conveyance barrier member of preselected permeability between at least first and second absorbent members, and orientating the adjacently disposed barrier member and first and second absorbent members wherein each of the first and second absorbent members has a ratio of horizontal width to vertical height of no more than about 10:1.

29. The method of claim 28 wherein the orientated adjacently disposed first and second absorbent members each have a ratio of horizontal width to vertical height of no more than about 1:1.

30. The method of claim 28 additionally comprising:

cutting the adjacently disposed first barrier member and first and second absorbent members to form an absorbent pad assembly.

31. The method of claim 30 wherein the adjacently disposed first barrier member and first and second absorbent members are cut prior to the orientation.

32. The method of claim 30 wherein the adjacently disposed first barrier member and first and second absorbent members are cut following the orientation.

33. The method of claim 30 wherein the cutting step comprises slit blade cutting.

34. The method of claim 30 wherein the cutting step comprises water jet cutting.

35. The method of claim 28 additionally comprising the step of bonding the adjacently disposed first barrier member with at least one of the first and second absorbent members prior to the orientation.

36. The method of claim 35 wherein the bonding step comprises adhesive bonding.

37. The method of claim 35 wherein the bonding step comprises thermal bonding.

38. The method of claim 35 wherein the bonding step comprises ultrasonic bonding.

39. The method of claim 35 wherein the first barrier member is bonded to each of the first and second absorbent members prior to the orientation.

40. The method of claim 28 wherein the first barrier member comprises an impermeable material.

41. The method of claim 28 wherein the first barrier member comprises a flow directional material.

42. The method of claim 28 wherein the first barrier member comprises a semipermeable material.

43. The method of claim 28 wherein the first barrier member and at least one of the first and second absorbent members are vertically coextensive.

44. The method of claim 43 wherein the first barrier member and both the first and second absorbent members are vertically coextensive.

45. The method of claim 28 wherein the first barrier member and at least one of the first and second absorbent members are vertically non-coextensive.

46. The method of claim 45 wherein the first barrier member and both the first and second absorbent members are vertically non-coextensive.

47. The method of claim 28 wherein the first barrier member is of intermittent form.

48. The method of claim 28 wherein the first and second absorbent members are each formed of materials of different absorbency.

49. The method of claim 28 wherein the first and second absorbent members are each formed of materials having similar absorbency.

50. The method of claim 28 additionally comprising a second barrier member spaced apart from the first barrier member by at least the second absorbent member.

51. The method of claim 50 wherein the first and second barrier members are spaced apart by at least one absorbent member in addition to the second absorbent member.

52. A method for forming an absorbent pad assembly, said method comprising:

horizontally layering at least a first generally planar fluid conveyance barrier member of preselected permeability between first and second absorbent members and

vertically reorientating the horizontally layered barrier member and first and second absorbent members.

53. The method of claim 52 additionally comprising:  
cutting the horizontally layered first conveyance barrier member and first and  
second absorbent members.

54. The method of claim 52 additionally comprising the step of bonding  
the horizontally layered first conveyance barrier member to the first and second absorbent  
members, respectively, prior to the vertical reorientation.

55. The method of claim 52 wherein the vertically reorientated first and  
second absorbent members each have a width of no more than about 20 mm.

56. The method of claim 52 wherein the vertically reorientated first and  
second absorbent members each have a width to height ratio of less than 1.

57. In an absorbent article having a contact surface, the absorbent article  
including a liquid pervious cover, a liquid impervious backsheet and an absorbent pad  
assembly disposed between the cover and the backsheet, a method for improving the fluid  
management by said absorbent article, said method comprising:

utilizing an absorbent pad assembly including a first generally planar fluid  
conveyance barrier member having a preselected permeability interposed between a pair of  
absorbent members generally perpendicularly disposed relative to the contact surface.

58. The method of claim 57 wherein the absorbent article is in the form  
of a sanitary napkin.

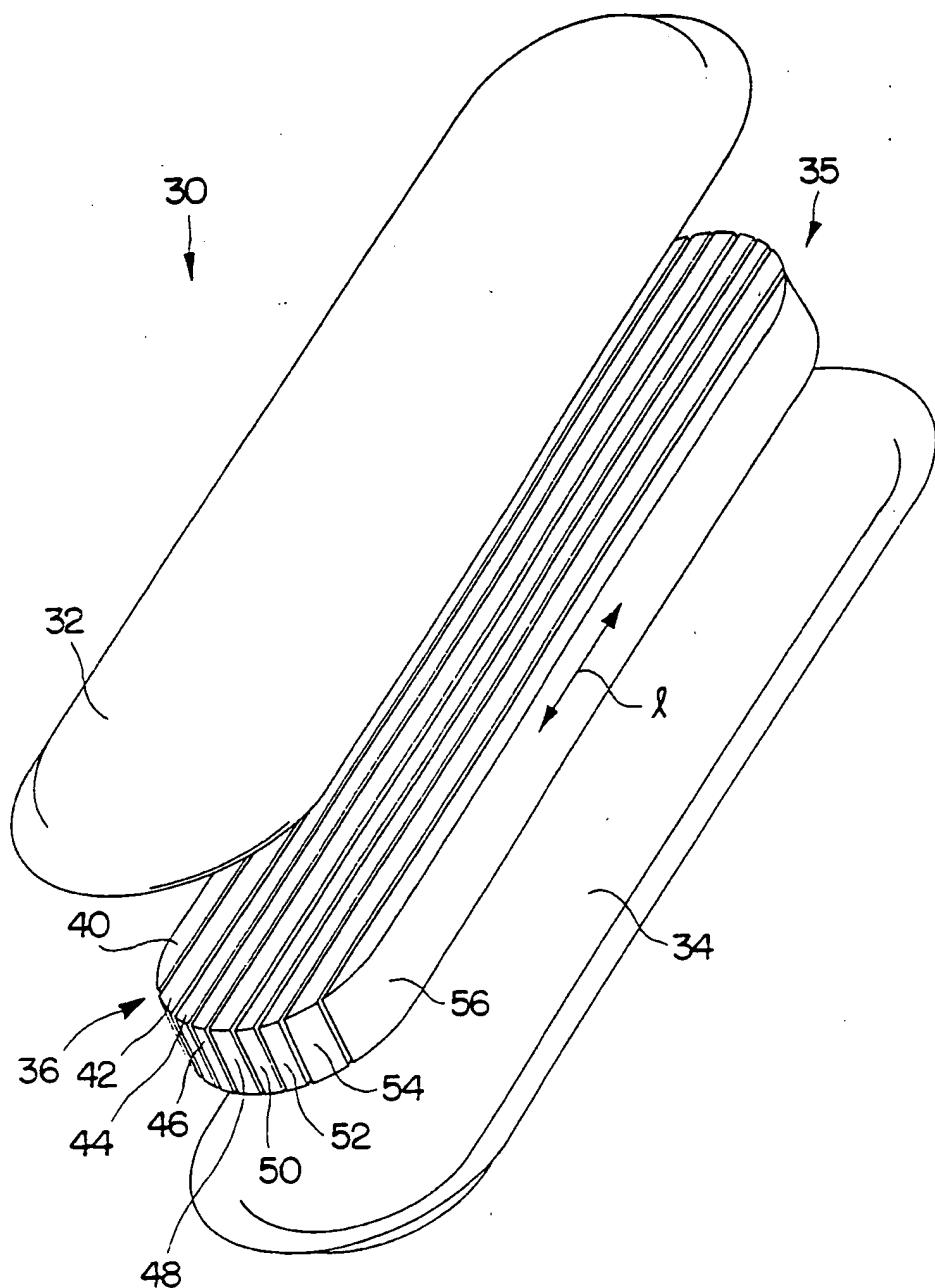


FIG. I

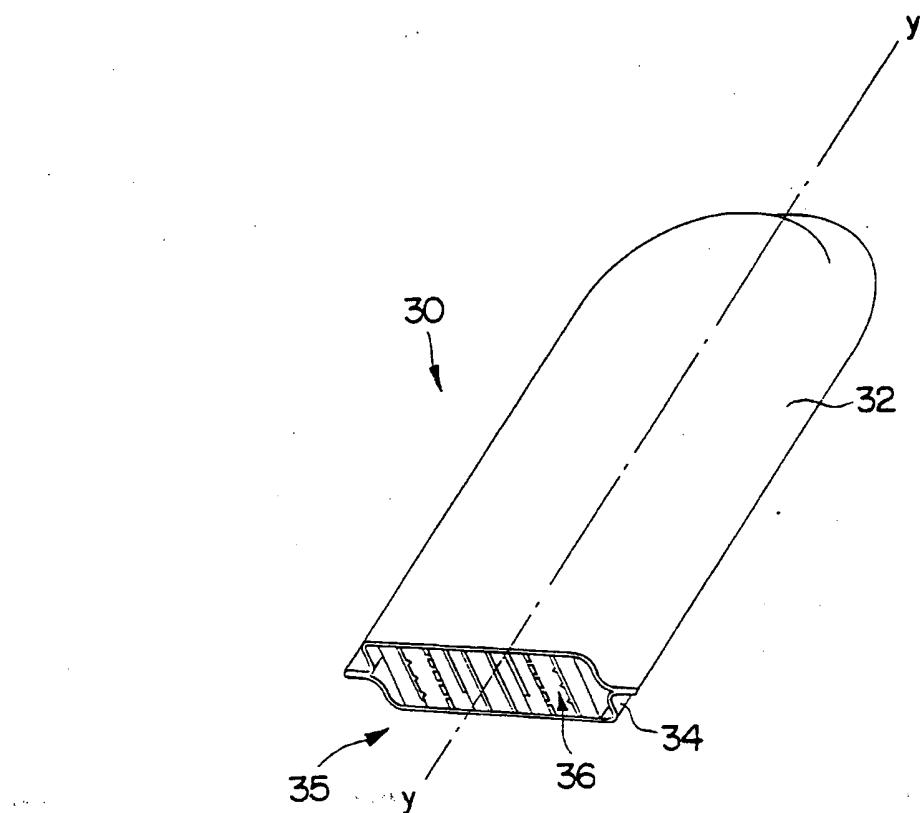


FIG.2

3/6

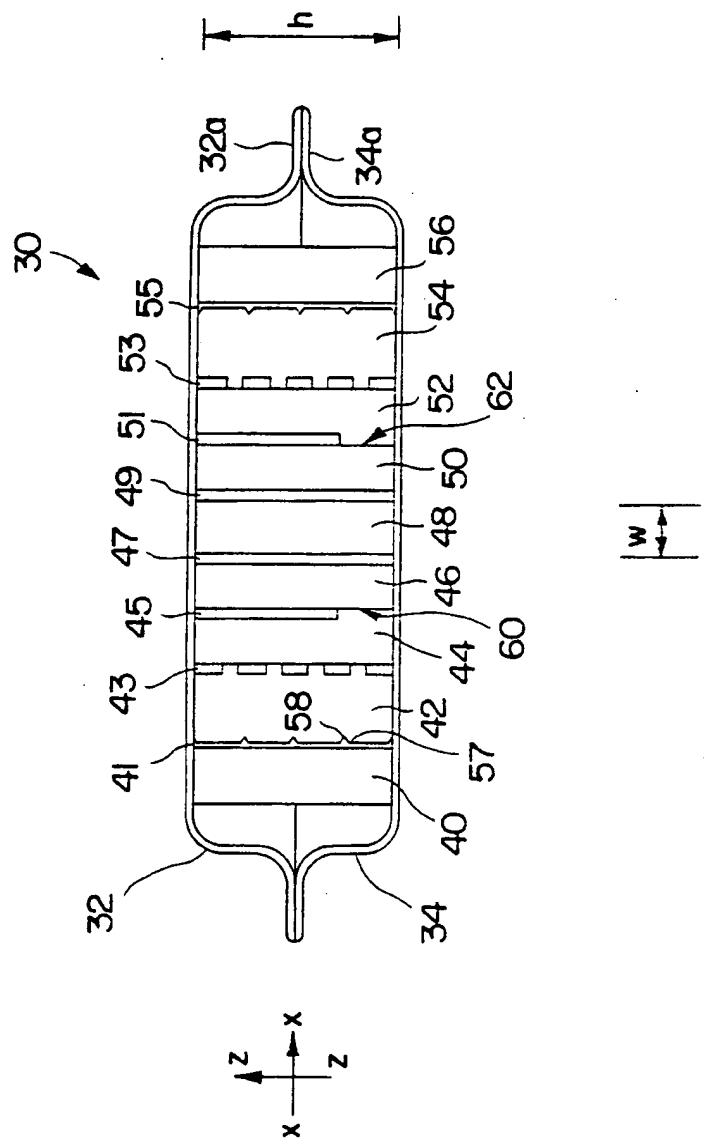


FIG. 3

4/6

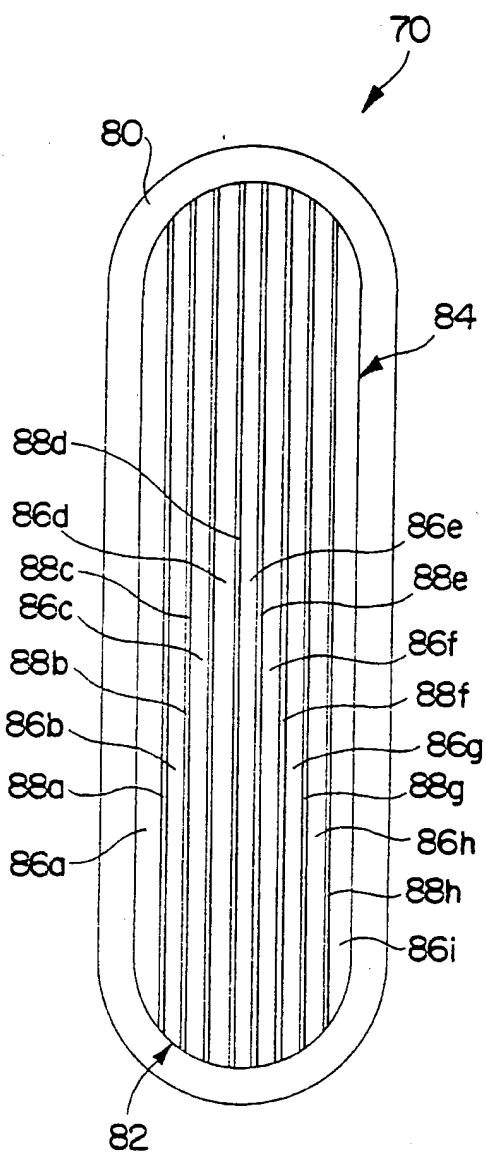


FIG. 4

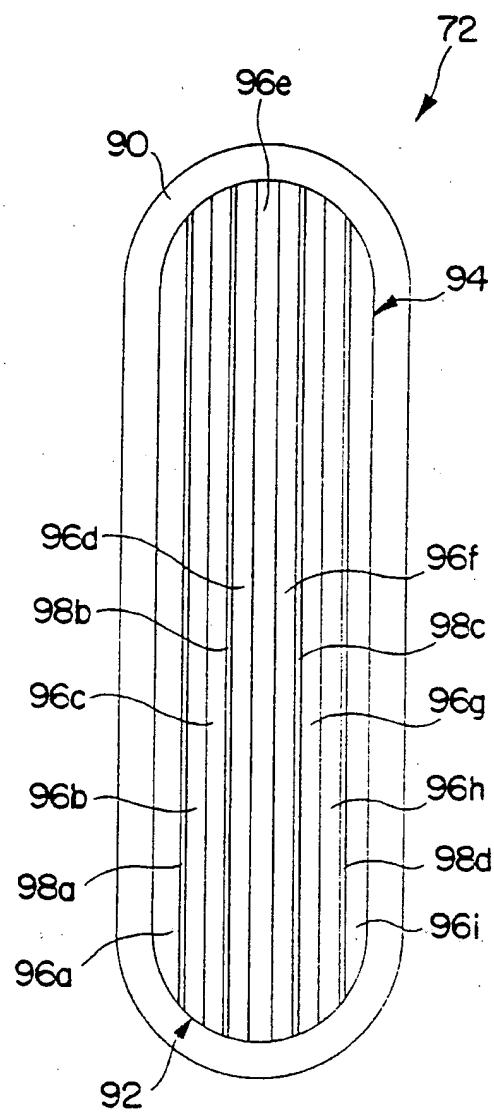


FIG. 5

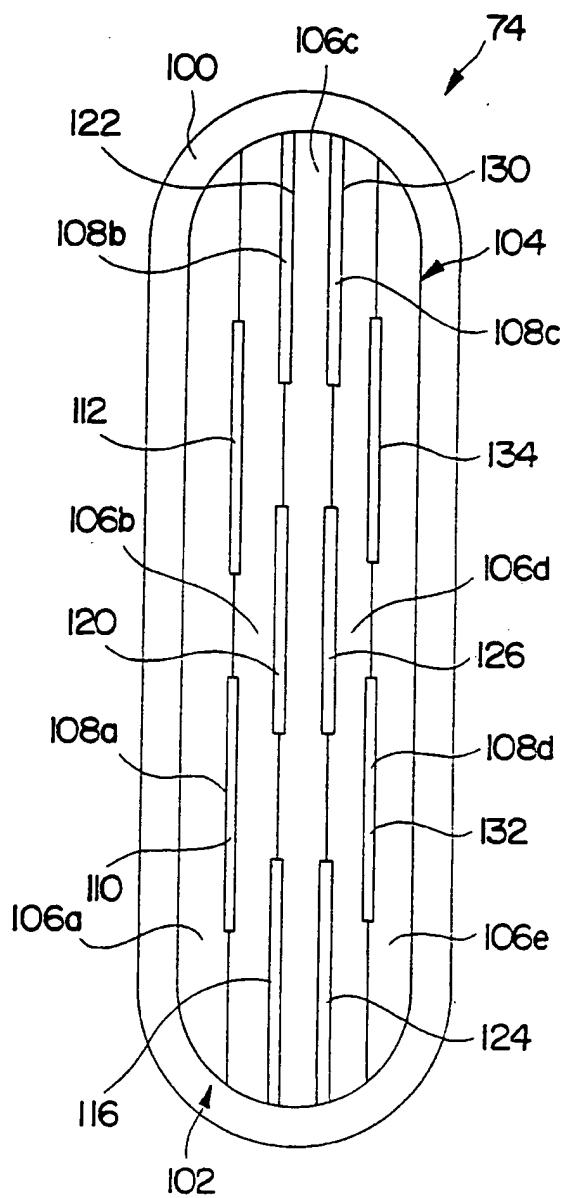


FIG.6

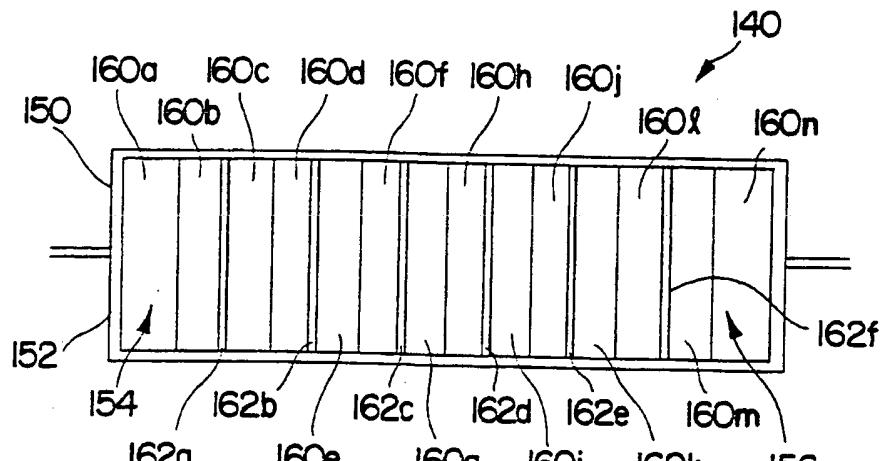


FIG. 7

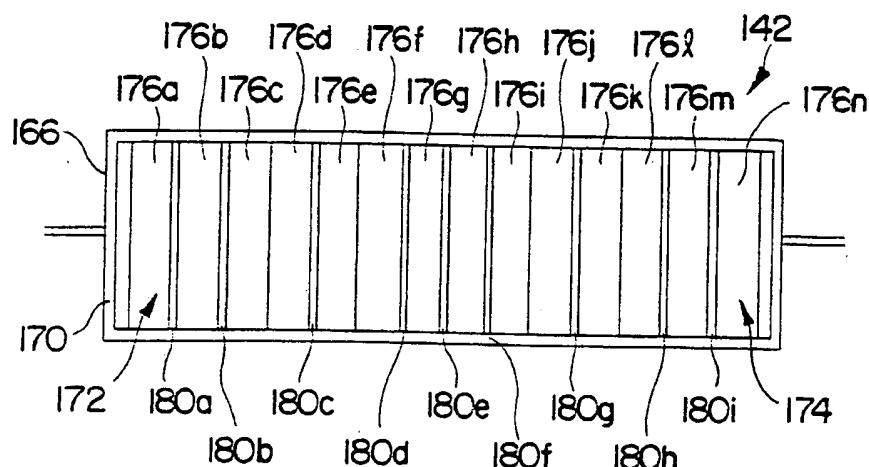


FIG. 8

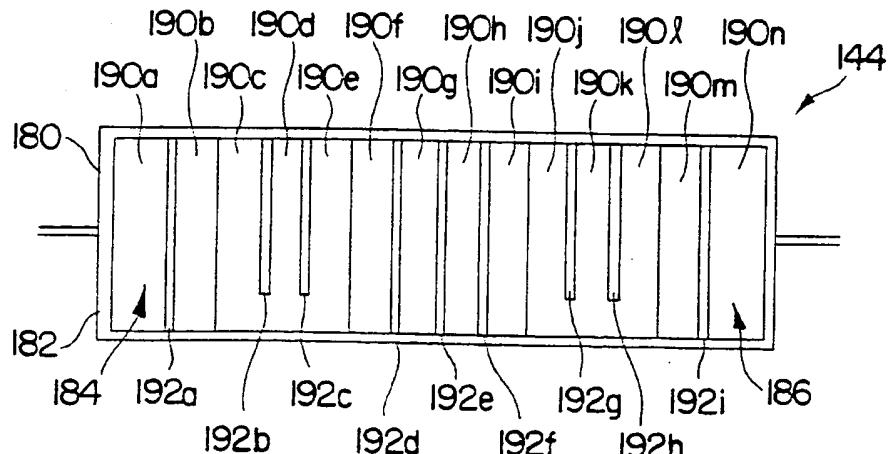


FIG. 9

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/40758

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 A61F13/532

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 366 079 A (MCNEIL PPC INC) 2 May 1990 (1990-05-02)  page 5, line 6 - line 8; claims; figures 1-5 page 5, line 19 - line 25 ----	1,2,4-6, 10-12, 14,15, 18,19, 21,23, 25-27, 57,58
A	----- -/-	28,29

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed Invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&\* document member of the same patent family

Date of the actual completion of the international search

12 January 2001

Date of mailing of the international search report

23/01/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Mirza, A

**INTERNATIONAL SEARCH REPORT**

International Application No  
PCT/US 00/40758

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 159 671 A (KIMBERLY CLARK CO) 30 October 1985 (1985-10-30)	1,3,5,6, 11,15, 28,29, 41,49, 52,56-58
A	page 6, line 32 -page 7, line 27; claims; figures 5,6	18,22, 25-27, 31-39, 53,54
X	US 3 838 694 A (MESEK F) 1 October 1974 (1974-10-01)	1,3,5,6, 11-13, 18,19, 22,25, 26,57
A	the whole document	28,29
X	US 4 015 604 A (CSILLAG CHARLES) 5 April 1977 (1977-04-05)	1,2,5-8, 11,12, 18,19, 21, 25-27, 57,58
	claims; figures	
X	US 3 993 820 A (REPKE VIRGINIA L) 23 November 1976 (1976-11-23)	1,3,5,6, 11,12, 18,19, 22,25
	claims; figures 1-21	
X	WO 98 56326 A (TEXON MATERIALES S L ;TEXON UK LTD (GB); CHAPMAN ROGER ALAN (GB);) 17 December 1998 (1998-12-17)	1-4,9, 11,12, 18,19, 21-23, 25-27, 57,58
A	claims; figures	28,29
A	US 5 869 171 A (DYER JOHN COLLINS ET AL) 9 February 1999 (1999-02-09) column 9, line 43 - line 63; claims; figure 14	1,10,48
A	EP 0 586 936 A (KIMBERLY CLARK CO) 16 March 1994 (1994-03-16) cited in the application claims 68-75; figures	17

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/US 00/40758

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP 0366079	A 02-05-1990	AT 149087 T AU 631380 B AU 4370689 A BR 8905409 A CA 2001370 A CN 1043258 A, B DE 68927793 D DE 68927793 T ES 2098224 T GR 89100682 A, B IE 78011 B JP 2257951 A NZ 231115 A PT 92089 A, B US 5399175 A US 5151091 A ZA 8908059 A ZW 13289 A		15-03-1997 26-11-1992 26-04-1990 22-05-1990 24-04-1990 27-06-1990 03-04-1997 12-06-1997 01-05-1997 30-12-1991 11-02-1998 18-10-1990 26-08-1992 30-04-1990 21-03-1995 29-09-1992 26-06-1991 12-06-1991
EP 0159671	A 30-10-1985	US 4627848 A AU 4146885 A BR 8501899 A GB 2157571 A JP 60234660 A		09-12-1986 31-10-1985 24-12-1985 30-10-1985 21-11-1985
US 3838694	A 01-10-1974	AT 347372 B AT 562574 A AU 7069274 A BE 817461 A CA 1045303 A CH 581963 A DE 2432697 A DK 364374 A ES 223521 Y FI 209474 A FR 2236987 A GB 1473691 A JP 50037546 A NL 7409270 A NO 742261 A PH 10804 A SE 7408943 A ZA 7404356 A		27-12-1978 15-05-1978 08-01-1976 09-01-1975 02-01-1979 30-11-1976 30-01-1975 24-02-1975 16-04-1977 10-01-1975 07-02-1975 18-05-1977 08-04-1975 13-01-1975 03-02-1975 07-09-1977 10-01-1975 25-02-1976
US 4015604	A 05-04-1977	AR 216758 A AT 970076 A AU 504756 B AU 2155277 A BE 850009 A BR 7701456 A DE 2658606 A ES 236462 Y FR 2355513 A GR 60785 A IN 145028 A IT 1073165 B JP 1263674 C JP 52118358 A		31-01-1980 15-05-1981 25-10-1979 27-07-1978 30-06-1977 08-11-1977 06-10-1977 16-11-1978 20-01-1978 28-08-1978 12-08-1978 13-04-1985 16-05-1985 04-10-1977

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/US 00/40758

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
US 4015604 A			JP 59039134 B LU 76767 A NL 7700489 A NZ 183124 A PH 13089 A PT 66051 A, B ZA 7607658 A ZM 1977 A	21-09-1984 30-06-1977 27-09-1977 11-01-1979 23-11-1979 01-02-1977 30-08-1978 21-11-1977
US 3993820 A	23-11-1976		NONE	
WO 9856326 A	17-12-1998		AU 8028598 A EP 1009349 A	30-12-1998 21-06-2000
US 5869171 A	09-02-1999		US 5817704 A AU 1965397 A BR 9707961 A CA 2248178 A CN 1217663 A EP 0888137 A JP 11506803 T WO 9732612 A US 5856366 A	06-10-1998 22-09-1997 27-07-1999 12-09-1997 26-05-1999 07-01-1999 15-06-1999 12-09-1997 05-01-1999
EP 0586936 A	16-03-1994		US 5336552 A AU 668973 B AU 4478193 A BR 9303033 A CA 2084255 A CN 1085972 A, B DE 69307229 D DE 69307229 T ES 2097406 T JP 6073651 A KR 236629 B MX 9302490 A ZA 9304767 A	09-08-1994 23-05-1996 03-03-1994 15-03-1994 27-02-1994 27-04-1994 20-02-1997 24-04-1997 01-04-1997 15-03-1994 02-03-2000 28-02-1994 20-01-1994